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IN AN
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THE USE OF THE BR SOLVENT RECOVERY SYSTEM
IN AN ANATOMIC PATHOLOGY LABORATORY

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ABSTRACT

Considerable amounts of hazardous waste are produced in an Anatomic Pathology Laboratory due to the utilization of the solvent xylene. Xylene in histotechnology is used as an antimediation bridging the dehydrant ethyl alcohol with the embedding medium paraffin wax and also for the dewaxing of tissue paraffin sections which have been mounted on microscope slides, so they may be treated with aqueous stains and reagents to produce a visible microscopic image. Previously, xylene was put into 205 litre waste drums which were held for removal and disposal by a licensed waste disposal company. This was a high cost procedure as the waste disposal of xylene cost more than the initial purchase of the solvent. Therefore, a means of recycling was sought that would be cost-effective and reliable and fulfil the three R's of waste management (reduce, reuse and recycle). To accomplish this, a solvent distillation unit was selected and installed which has successfully recycled all of our laboratory's solvent wastes.

INTRODUCTION

With a view to recycling xylene and other solvents such as chloroform, ethyl alcohol and methyl alcohol, three companies that produce equipment which was thought suitable to our purpose were contacted and information obtained regarding the suitability of their equipment and specifications into the final quality of the recycled product. The purpose of this project was to eliminate the disposal of 90% of our waste xylene and recycle this back into general laboratory use. In addition to our primary waste source xylene, we also had small volumes of waste chloroform. Both these reagents are classified as hazardous wastes. In 1990, 1,900 litres of xylene were purchased at a contract price of \$1,900.00. As very little of this solvent was lost when used for laboratory processing, our waste was virtually the same volume as that which we purchased.

The cost of waste disposal for 1990 was \$1,980.00. Thus, the purchase and disposal costs of xylene for Anatomic Pathology was approximately \$3,880.00 for a fiscal year. Chloroform which is used in our Cytology Department produced 45 litres of waste during the same year. Reclaiming this solvent represented a cost savings of \$300.00 per year (includes purchase price and disposal price). An application for a grant to assist us in the purchase and installation of a solvent recovery system was made to the Industrial Waste Diversion Program of the Ministry of the Environment, Waste Management Branch, on February 5, 1991. This grant submission outlined a summary of estimated cost which was \$28,000.00, the anticipated duration of the project, the various solvents that would be recycled giving total volume purchased and total volume recovered, and the residual waste identified. The environmental and cost savings benefits derived from this recycling system were indicated and the potential for this institution to set the example to other hospitals in Ontario was emphasized, as a considerable decrease in potential environmental hazards from hospitals could be derived.

PROJECT

A decision had to be made as to particular type of recycling system to be purchased. This was done by attending a meeting in Orlando, Florida, where the three major companies involved in this type of solvent recycling were present. Each system was examined and the company representatives from each source questioned. Information, statistics and quotations from each company were brought back to the Department of Laboratory Medicine at the Hamilton General Hospital where they were discussed with our Clinical Chemist, Dr. D. Strickland. After taking into consideration the various aspects, i.e. cost, size, and quality of reclaimed solvents, the BR Solvent Recovery System was decided on. A purchase order was issued to Parks Scientific

Canada, Inc., Edmonton, Alberta on October 24, 1991. The system was delivered February 25, 1992. Installation was completed in one day on March 2, 1992, by the company representative. Training of the anatomical pathology supervisor took three hours to review programming, maintenance and fault finding. A further training of one hour was necessary for the training of the laboratory assistants who would use and maintain the equipment.

START-UP

On the day following installation and during training, our first batch of xylene was recycled. This proved completely satisfactory. On day three, the system was programmed for chloroform; this was also recycled and was entirely satisfactory. The waste products from the recycling of 12 litres of xylene were separated into two parts. One is ethyl alcohol which is delivered into a 20 litre waste tank during the recycling process. This amounts to approximately 600 mL. The second part is paraffin wax, weighing approximately 40.0 g. This remains in the glass recycling container where it is then dispensed back into the bags the wax was originally received in. When the quantity is of such an amount to require disposal, this is done so in a suitable manner.

TECHNICAL PROBLEMS

Up to the present time, the technical problems have been minor. The flimsy solvent transfer pump had to be replaced by a more substantial model at a cost of \$6.00 and the solvent overflow safety mechanism developed a fault after three months of use. This did not prevent the recycling of our solvents, as an alternative piece of equipment is supplied for such emergencies. The faulty sensor was replaced quickly under warranty. Since then, no problems have ensued.

CONCLUSION

The BR Solvent Recycling equipment has been operating three days out of five per five day

week. This we have found sufficient to meet our current demands, but may have to be increased in the future if we start a recycling program on methyl alcohol for our hematology and clinical chemistry laboratories. The system has performed up to expectations. The recycled solvents are used as the original material with excellent results. During a five and a half month period, 630 litres of waste xylene have been recycled and 20 litres of chloroform. There has been no need for waste disposal since the implementation of this system. It is estimated that the hospital cost will be recuperated in three years when inflation costs are taken into consideration. For those contemplating the purchase of a recycling system, it is important at the onset to designate an area suitable for the installation, with sufficient power outlets, fume extraction for connecting to the cabinet, and whether water cooling or refrigerator cooling is required.

